REMARKS

Amendments

Claim 16 is cancelled. Claims 1-15 and 17-21 are amended to use language in accordance with conventional US practice, and to delete superfluous language. Claim 1 is also amended to recite that the alignment layer comprises a polymer film that contains at least one reactive mesogen additive in monomeric, oligomeric or polymeric form, and that, after preparation of the alignment layer, the alignment layer contains unreacted polymerizable groups in the at least one reactive mesogen additive. See, e.g., page 14, lines 10-11, and 26-29.

Claims 6, 9, and 13 are amended to refer to the polymer film, rather than the alignment layer. See, e.g., page 6, lines 12-16. Claim 7 is amended to identify the structure of formula A as a repeating unit. Claim 15 is amended to be in independent form.

New claims 22-30 are directed to further aspects of the invention and are supported throughout the disclosure. See, e.g., page 6, line 34 – page 7, line 4, page 7, lines 17-21, page 9, line 30 – page 10, line 6, page 12, lines 7-19, and page 13, lines 21-23.

Rejection under 35 USC 112, second paragraph

Claims 1-21 are rejected as allegedly being indefinite under 35 USC 112, second paragraph. This rejection is respectfully traversed.

Claim 1 expressly recites that the film contains at least one reactive mesogen additive which is in monomeric, oligomeric or polymeric form. See also page 14, lines 10-11. This conventional chemical language describes the form of the at least one reactive mesogen additive, and is more than sufficiently clear to one of ordinary skill in the art. Thus, the language is not indefinite. Further, claim 1 is amended to expressly recite that that, after preparation of the alignment layer, the alignment layer contains unreacted polymerizable groups in the at least one reactive mesogen additive. The language of claim 3 is also further clarified.

Claims 6, 9, and 13 are amended to refer to the polymer film, rather than the alignment. Claim 7 is amended to refer to the structure of formula A as repeating units.

With respect to Formula Ia in claim 13, it is respectfully submitted that the

identification of one substituent as L^2 is not indefinite, since L^1 and L^2 are defined the same. However, the claim is amended so that Formula Ia shows two L^1 substituents.

Claim 14 is amended to recite that precursor material is a precursor of the alignment layer. Claim 16 is cancelled, and claim 19 is amended to delete reference to laminate.

In view of the above remarks, withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 101

Claims 16 and 19 are rejected as allegedly being indefinite under 35 USC 101. Claim 16 is cancelled and claim 19 is converted into a device claim. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 102(b) in view of Yoshioka

Claims 1, 5-7, 16, and 19-21 are rejected as allegedly being anticipated by Yoshioka et al. (US 5,000,545). This rejection is respectfully traversed.

Yoshioka et al. discloses a liquid crystal device comprising two electrode plates. At least one of the two electrode plates is provided with a uniaxial orientation treatment, and at least one of the two electrode plates comprises a substrate, transparent stripe electrodes, and metal electrodes. Each of the metal electrode is disposed along and forms a protrusion sticking out of at least one longitudinal edge of a transparent stripe electrode. See column 2, lines 15-25.

As described at column 3, lines 1-11, the electrode plate 11 shown in Figs. 1A and 1B can be coated with an alignment control film for controlling the alignment state of a ferroelectric smectic liquid crystal. The alignment control film has a uniaxial orientation treatment (achieved by rubbing, oblique vapor deposition or oblique etching), and can be formed from organic resins, such as polyimide, polyamide-imide, polyester-imide, polyether-imide, polyamide, polyvinyl alcohol, polyethylene and polyester.

See also Fig. 2 which shows electrode plates 11A and 11B with substrates 1A and 1B, transparent stripe electrodes 2A and 2B, narrow metal electrodes 3A and 3B, and alignment control films 22A and 22B. See column 3, lines 20-23.

In Example 1, Yoshioka et al. describes coating an electrode plate with a 0.1 μm thick SiO_2 film and a 100 Å-thick polyimide film. The polyimide film is formed by applying a 5

wt. % solution of a polyamic acid (namely, the dehydrocondensation product of pyromellitic acid dianhydride and 4,4'-diaminodiphenyl ether) in N-methylpyrrolidone, followed by heating at a temperature above 250 °C. See column 4, lines 21-28.

Yoshioka et al. does not, however, disclose or suggest an alignment layer that comprises a polymer film containing at least one reactive mesogen additive. Nor does Yoshioka et al. describe an alignment layer, comprising a polymer film containing at least one reactive mesogen additive, wherein the additive has unreacted polymerizable groups after preparation of the alignment layer. Thus, Yoshioka et al. fails to anticipate applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 102(b) in view of Gass

Claims 1, 3, 4, 6, 15, 16, and 19-21 are rejected as allegedly being anticipated by Gass (US 5,808,716). This rejection is respectfully traversed.

Gass discloses a liquid crystal display having a cell filled with a liquid crystal material, and in which the glass cell walls have alignment layers are formed. In order to increase resistance to mechanical damage, the liquid crystal layer is bonded to the alignment layers. See the abstract.

According to one of the described techniques for making the cell, the glass plates forming the cell walls are coated with alignment layers that contain reactive groups. The liquid crystal material, i.e., a ferroelectric liquid crystal material, contains reactive mesogenic groups that are located either directly on the rigid core of the mesogenic molecule or on a flexible alkyl chain. The reactive groups in the ferroelectric liquid crystal material and alignment layers are capable of selectively bonding the ferroelectric liquid crystal material to the alignment layers. To achieve this bonding, the cell is filled with the ferroelectric liquid crystal material, and a smectic structure is initially aligned by cooling from the higher temperature phases. When the temperature for obtain the smectic layer structure is achieved, the chemical bonding is induced between the reactive groups in the alignment layers and in the ferroelectric liquid crystal material, e.g. by ultraviolet illumination.

Thus, Gass discloses an alignment layer that can react with a reactive liquid crystal material brought into contact with the alignment layer. Gass does not, however, disclose or suggest an alignment layer that comprises a polymer film containing at least one reactive

mesogen additive. Nor does Gass describe an alignment layer, comprising a polymer film containing at least one reactive mesogen additive, wherein the additive has unreacted polymerizable groups after preparation of the alignment layer. Thus, Gass fails to anticipate applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 102(b) in view of Ichimura

Claims 1, 2, 4, 5, 6, 8, 10, 11, 15, 16, and 19-21 are rejected as allegedly being anticipated by Ichimura et al. (US 6,001,277). This rejection is respectfully traversed.

Ichimura et al. discloses a liquid-crystal display device that comprises a pair of substrates, each of which is provided with a liquid-crystal alignment film, at least one the substrates having an electrode, and a liquid crystal held between the substrates. The liquid-crystal alignment films comprise a resin that contains photoisomerizable and dichroic structural units, such as units of azobenzene derivatives and stilbene derivatives. See column 4, lines 7-47. As described at column 9, lines 31-44, the photoisomerizable and dichroic structural units may be mixed with the resin and can be chemically bonded to each other or to the resin by at least one of irradiation with light and heating.

Ichimura et al. does not, however, disclose or suggest an alignment layer that comprises a polymer film containing at least one reactive mesogen additive, wherein the additive has unreacted polymerizable groups after preparation of the alignment layer. Thus, Ichimura et al. fails to anticipate applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 102(b) in view of O'Neill

Claims 1, 4, 5, 12, 15, 16, and 19-21 are rejected as allegedly being anticipated by O'Neill et al. (US 2003/00219113). This rejection is respectfully traversed.

O'Neill et al. discloses a liquid crystal alignment layer containing a transport material that is chemically bound to the alignment layer. As described in paragraph [0005], transport material in the alignment layer produces enhanced electrical conductivity thereof. But, when the alignment layer is used in a liquid crystal cell, transport material tends to migrate into the liquid crystal. This problem can be addressed by chemically binding the transport material to the alignment layer.

As discussed in paragraphs [0024]-[0026], the alignment layer can comprise a side chain liquid crystal polymer, or can comprise a reactive liquid crystal formed from a reactive mesogen. This reactive liquid crystal can be formed by coating onto a substrate, drying and curing within the liquid crystal phase to form an anisotropic polymer film. In these cases the liquid crystal polymer or reactive mesogen is coated onto a conventional alignment layer.

O'Neill et al. does not, however, disclose or suggest an alignment layer that comprises a polymer film containing at least one reactive mesogen additive. Nor does O'Neill et al. describe an alignment layer, comprising a polymer film containing at least one reactive mesogen additive, wherein the additive has unreacted polymerizable groups after preparation of the alignment layer. Thus, O'Neill et al. fails to anticipate applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 102(b) in view of Nam

Claims 1, 4, 5, 8, and 19-21 are rejected as allegedly being anticipated by Nam (US 6,764,724). This rejection is respectfully traversed.

Nam et al. discloses a liquid crystal display device that comprises first and second substrates; a first alignment layer on the first substrate, and a liquid crystal layer between the first and second substrates. The first alignment layer includes a structure in accordance with the formula shown at the top of column 3, which structure includes a functional group R which can be a photo-sensitive constituents selected from cinnamoyl derivatives.

Nam et al. does not, however, disclose or suggest an alignment layer that comprises a polymer film containing at least one reactive mesogen additive. Nor does Nam et al. describe an alignment layer, comprising a polymer film containing at least one reactive mesogen additive, wherein the additive has unreacted polymerizable groups after preparation of the alignment layer. Thus, Nam et al. fails to anticipate applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 102(b) in view of Kumar

Claims 1, 6, 10, 11, 16, and 19-21 are rejected as allegedly being anticipated by Kumar (US 6,939,587). This rejection is respectfully traversed.

Kumar discloses a method for simultaneously fabricating a system having two layers,

i.e., a layer of homogeneously aligned liquid crystal material and a layer of polymer alignment film. The method comprises preparing a mixture of liquid crystal, prepolymer and a polarization-sensitive material. This mixture is then disposed on a substrate, and polarized light from a light source is applied. The applied polarized light induces simultaneous phase separation of the mixture and alignment of the phase separated liquid crystal thereby forming on the substrate the layer of homogeneously aligned liquid crystal material adjacent the layer of polymer and the polarization-sensitive material. See column 4, lines 35-46. As described at column 8, lines 8-26, the liquid crystal material can a reactive liquid crystal material.

In any event, the layer of homogeneously aligned liquid crystal material is separated from the alignment layer as a result of the application of the polarized light. Kumar does not disclose or suggest an alignment layer that comprises a polymer film containing at least one reactive mesogen additive. Nor does Kumar describe an alignment layer, comprising a polymer film containing at least one reactive mesogen additive, wherein the additive has unreacted polymerizable groups after preparation of the alignment layer. Thus, Kumar fails to anticipate applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Gass

Claims 5, 17, and 18 are rejected as allegedly being obvious in view of Gass (US 5,808,716). This rejection is respectfully traversed.

In the rejection, it is asserted that it would be obvious to modify the system disclosed by Gass in order to provide a laminate comprising an alignment layer and a film of polymerized or crosslinked liquid crystal material. However, as noted above, Gass does not, however, disclose or suggest an alignment layer that comprises a polymer film containing at least one reactive mesogen additive. Nor does Gass describe an alignment layer, comprising a polymer film containing at least one reactive mesogen additive, wherein the additive has unreacted polymerizable groups after preparation of the alignment layer.

In view of the above remarks, it is respectfully submitted that Gass fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Ichimura

Claims 7 and 9 are rejected as allegedly being obvious in view of Ichimura et al. (US

6,001,277). This rejection is respectfully traversed.

In the rejection, it is asserted that it would be obvious to modify the polyimide layer disclosed by Ichimura et al. to include a repeat unit in accordance with applicants' formula A. It is further argued that it would be obvious to use a cellulose based film matrix for the alignment layer of Ichimura et al.

However, as noted above, Ichimura et al. does not, however, disclose or suggest an alignment layer that comprises a polymer film containing at least one reactive mesogen additive, wherein the additive has unreacted polymerizable groups after preparation of the alignment layer.

In view of the above remarks, it is respectfully submitted that Ichimura et al. fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of O'Neill

Claims 10 and 11 are rejected as allegedly being obvious in view of O'Neill et al. (US 2003/00219113). This rejection is respectfully traversed.

In the rejection, it is asserted that it would be obvious to modify the alignment layer disclosed by O'Neill et al. to include chromophore compounds. However, as noted above, O'Neill et al. does not, however, disclose or suggest an alignment layer that comprises a polymer film containing at least one reactive mesogen additive. Nor does O'Neill et al. describe an alignment layer, comprising a polymer film containing at least one reactive mesogen additive, wherein the additive has unreacted polymerizable groups after preparation of the alignment layer.

In view of the above remarks, it is respectfully submitted that O'Neill et al. fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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